SYSTEM AND METHOD OF MANAGING FAILURE OF AN ELECTRONIC SHELF LABEL TO RESPOND TO A MESSAGE

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ABSTRACT

A system and method of managing failure of an electronic shelf label to respond to a message which conserves system bandwidth. The system includes an electronic shelf label which fails to respond to a first message, and a computer for resending the first message to the electronic shelf label at a first rate during a first time period, for identifying the electronic shelf label as unresponsive if the computer fails to receive an acknowledgment from the electronic shelf label during the first time period, and for sending a second message for determining whether the electronic shelf label exists at a second rate during a second time period.

14 Claims, 2 Drawing Sheets
FIG. 3

START

ESL SOFTWARE 20 FAILS TO RECEIVE A RESPONSE TO A
RESPONSE TO UPDATE OR BEDCHECK OR OTHER MESSAGES

EPL SOFTWARE 20 SENDS THE MESSAGES DURING
A RETRY PERIOD AT A RETRY MESSAGE RATE

ACKNOWLEDGEMENT ?

Y

RETRY PERIOD OVER ?

N

ESL SOFTWARE 20 SETS THE LOST FLAG

ESL SOFTWARE 20 SENDS LOCATING
MESSAGES AT THE LOCATING MESSAGE RATE

ACKNOWLEDGEMENT ?

Y

PERIOD END OVER ?

N

ESL SOFTWARE 20 OPTIONALLY CREATES A
SCRIPT FOR ADDING ESL 14 TO ESL DATA FILE 32

ESL SOFTWARE 20 REMOVES ESL 14 FROM
ESL DATA FILE 32

END
SYSTEM AND METHOD OF MANAGING FAILURE OF AN ELECTRONIC SHELF LABEL TO RESPOND TO A MESSAGE

BACKGROUND OF THE INVENTION

The present invention relates to electronic shelf label (ESL) systems, and more specifically to a system and method of managing failure of an electronic shelf label to respond to a message.

ESL systems typically include a plurality of ESLs for merchandise items in a transaction establishment. ESLs typically display the price of corresponding merchandise items on store shelves and are typically attached to a rail along the leading edge of the shelves. A transaction establishment may contain thousands of ESLs to display the prices of the merchandise items. The ESLs are coupled to a central server from where information about the ESLs is typically maintained in an ESL database or data file. Price information displayed by the ESLs is obtained from a price look-up (PLU) data file and stored within an ESL price change record.

Inevitably, some ESLs do not or cannot communicate. Failures may be caused by poor location or a malfunction with the ESL. When communication is poor, ESL system performance degrades because message queues are lengthened and because bandwidth is utilized to attempt to communicate with unresponsive ESLs. The situation is aggravated by the need to verify data integrity using more messages.

Therefore, it would be desirable to provide a system and method of managing failure of an electronic shelf label to respond to a message.

SUMMARY OF THE INVENTION

In accordance with the teachings of the present invention, a system and method of managing failure of an electronic shelf label (ESL) to respond to a message is provided.

The system includes an electronic shelf label which fails to respond to a first message, and a computer for resending the first message to the electronic shelf label at a first rate during a first time period, for identifying the electronic shelf label as unresponsive if the computer fails to receive an acknowledgment from the electronic shelf label during the first time period, and for sending a second message for determining whether the electronic shelf label exists at a second rate during a second time period.

It is accordingly an object of the present invention to provide a system and method of managing failure of an electronic shelf label to respond to a message.

It is another object of the present invention to maximize ESL system bandwidth by minimizing overall communications to unresponsive ESLs.

BRIEF DESCRIPTION OF THE DRAWINGS

Additional benefits and advantages of the present invention will become apparent to those skilled in the art to which this invention relates from the subsequent description of the preferred embodiments and the appended claims, taken in conjunction with the accompanying drawings, in which:

FIG. 1 is a block diagram of a transaction processing system;

FIG. 2 is a diagram showing data files used within a transaction establishment; and

FIG. 3 is a flow diagram illustrating software operation.
a minimum retry time has passed and a minimum number of messages have been sent. After the minimum retry number and minimum messages have been reached, messages end when either a maximum number of retry attempts is reached, or until a maximum retry period is reached, whichever comes first.

ESL software 20 either receives a response or sets the UNRES flag. If ESL software 20 flags ESL 14 as unresponsive, ESL software 20 re-initiates communication and makes one additional attempt to communicate, but discontinues sending of update or bedcheck messages to ESL 14 to limit unnecessary messages and conserve bandwidth. During this attempt, the time period is infinite, but the message rate is lower in order to conserve overall ESL system bandwidth.

If this or further attempts to communicate with ESL 14 fail, then ESL software 20 may optionally remove the record from ESL data table 32. If ESL 14 is removed, then ESL software 20 may optionally generate a script for adding back ESL 14 as a new ESL if it ever responds, or in case it is removed due to ESL system error.

Turning now to FIGS. 3A and 3B, operation of ESL software 20 is illustrated in more detail beginning with START 40.

In step 42, ESL software 20 fails to receive a response to update or bedcheck messages, or other type of message.

In step 44, ESL software 20 sends the messages during a retry period at a retry message rate.

In step 46, ESL software 20 waits for an acknowledgement from ESL 14. If ESL software 20 receives an acknowledgement, operation ends at step 64. Otherwise, operation proceeds to step 48.

In step 48, ESL software 20 waits for the end of the message retry period. If ESL software 20 determines that the retry period has not ended, operation returns to step 44 to continue sending messages. Otherwise, operation proceeds to step 50.

In step 50, ESL software 20 sets the UNRES flag.

In step 52, ESL software 20 sends locating messages at a locating message rate.

In step 54, ESL software 20 waits for an acknowledgement from ESL 14. If ESL software 20 receives an acknowledgement, ESL software 20 clears the UNRES flag in step 56 and operation ends at step 64. Otherwise, operation proceeds to step 58.

In step 58, ESL software 20 determines whether the locating period is over. If not, operation returns to step 52. Otherwise, operation proceeds to step 60.

In an alternate embodiment, locating messages being sent indefinitely, without an end to the locating period.

In step 60, ESL software 20 optionally creates a script for adding a record for ESL 14 to ESL data table 32, in case of ESL system error.

In step 62, ESL software 20 removes ESL 14 from ESL data table 32.

Alternatively, one may consider that use of the UNRES flag would suffice. Since no update or bedcheck messages are sent to an unresponsive ESL 14, use of the UNRES flag produces almost the same effect as deleting the record.

In step 64, operation ends.

Although the present invention has been described with particular reference to certain preferred embodiments thereof, variations and modifications of the present invention can be effected within the spirit and scope of the following claims.

We claim:

1. An electronic shelf label system comprising: an electronic shelf label which fails to respond to a message containing data; and a computer for resending the message to the electronic shelf label at a first rate during a first time period, for identifying the electronic shelf label as unresponsive if the computer fails to receive an acknowledgment from the electronic shelf label during the first time period, and for sending a locating message at a second rate lower than the first rate during an indefinite time period.

2. A method of managing failure of an electronic shelf label to respond to a message comprising the steps of: resending the message to the electronic shelf label at a first rate during a first time period in response to the failure; identifying the electronic shelf label as unresponsive if an acknowledgment from the electronic shelf label is not received during the first time period; and sending another message for determining whether the electronic shelf label exists at a second rate during a second time period.

3. The method as recited in claim 2, further comprising the steps of: creating a script for adding the electronic shelf label to a record of installed electronic shelf labels; and removing the electronic shelf label from the record if the acknowledgment is not received during the second time period.

4. The method as recited in claim 2, wherein the step of sending comprises the substep of: sending another message at a second rate which is lower than the first rate.

5. The method as recited in claim 2, wherein the step of sending comprises the substep of: sending another message during a second time period which is indefinite.

6. A method of managing failure of an electronic shelf label to respond to a message containing data comprising the steps of: resending the message to the electronic shelf label at a first rate during a first time period in response to the failure; identifying the electronic shelf label as unresponsive if an acknowledgment from the electronic shelf label is not received during the first time period; and sending another message without the data at a second rate.

7. An electronic shelf label system comprising: an electronic shelf label which fails to respond to a first message; and a computer for resending the first message to the electronic shelf label at a first rate during a first time period, for identifying the electronic shelf label as unresponsive if the computer fails to receive an acknowledgment from the electronic shelf label during the first time period, and for sending a second message for determining whether the electronic shelf label exists at a second rate during a second time period.

8. The system as recited in claim 7, wherein the computer also creates a script for adding the electronic shelf label to a record of installed electronic shelf labels, and removes the electronic shelf label from the record if the computer fails to receive the acknowledgment during the second time period.

9. The system as recited in claim 7, wherein the second rate is lower than the first rate.
10. The system as recited in claim 7, wherein second time period is indefinite.

11. An electronic shelf label system comprising:
   an electronic shelf label which fails to respond to a first message containing data; and
   a computer for resending the first message to the electronic shelf label at a first rate during a first time period, for identifying the electronic shelf label as unresponsive if the computer fails to receive an acknowledgment from the electronic shelf label during the first time period, and for sending a second message without the data at a second rate during a second time period.

12. A method of managing failure of an electronic shelf label to respond to a first type of message comprising the steps of:
   resending the first type of message to the electronic shelf label at a first rate during a first time period in response to the failure;
   identifying the electronic shelf label as unresponsive if an acknowledgment from the electronic shelf label is not received during the first time period; and
   sending a different type of message for determining whether the electronic shelf label exists at a second rate lower than the first rate during a second time period.

13. A method of managing failure of an electronic shelf label to respond to a bedcheck message comprising the steps of:
   resending the bedcheck message to the electronic shelf label at a first rate during a first time period in response to the failure;
   identifying the electronic shelf label as unresponsive if an acknowledgment from the electronic shelf label is not received during the first time period; and
   sending a locating message for determining whether the electronic shelf label exists at a second rate lower than the first rate for an indefinite period of time.

14. A method of managing failure of an electronic shelf label to respond to a message comprising the steps of:
   determining a minimum number of retry attempts;
   resending the message to the electronic shelf label at a first rate during a first retry period in response to the failure;
   counting the messages sent during the first retry period; if a count of the messages equals the minimum number of retry attempts and an acknowledgment from the electronic shelf label is not received, identifying the electronic shelf label as unresponsive; and
   sending a locating message for determining whether the electronic shelf label exists at a second rate lower than the first rate during a the second retry period.